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PROF. DODEL-PORT ON THE FERTILISATION OF RED SEA-WEEDS BY ANIMALCULÆ.

IN a recent number of the excellent periodical 'Kosmos,' Dr. Dodel-Port, the eminent botanist, of Zurich, has published the results of a series of observations made by him regarding the part played by Animalculæ in the fertilisation of a certain species of *Florideæ*, or red sea-weed, viz., *Polysiphonia subulata*, J. Agas. The paper is of great biological importance, since it forms, so far as our knowledge extends, the first record of the participation of animals in the fertilisation of cryptogams, which in itself is an interesting parallel to the relations existing between insects and phanerogams. We have pleasure therefore in presenting our readers with an illustrated abstract of the paper in question.*

In previous numbers of the periodical referred to, Dr. Hermann Müller has sketched the history of evolution of the floral world, and has shown the basis upon which the entire relation between flowers and insects rests. This basis is the transition of the male sexual cells from the liquid medium of water into the dry atmosphere which occurred at the upper boundary of the cryptogamic flora of prehistoric times.

In almost all cryptogams which are not agamic, the contents of the male cells are actively movable; when they leave the cell they move freely about in the water by means of vividly oscillating cilia. They thus possess the faculty of moving inde-

* For the translation from the German we are indebted to Mr. Carl Armbruster, and for the use of the woodcuts to the publishers of 'Nature.'

pendently, like any free aquatic animal, to the distant female organ, there to complete fertilisation. In the case of phanerogams the independent mobility of the pollen-grains is an impossibility. To effect the union of pollen-grains with that particular part of the female flower which is destined to receive them, some external agent must interfere. In many cases, especially in the lower orders of the floral world, the wind, gravitation, or both together, are the agents in question; in the majority of higher phanerogams, insects, or occasionally other animals, are instrumental in conveying the pollen.

Now there are a great number of cryptogams in which the male sexual cells which are emptied into the water do not possess the faculty of independent motion, as they are not endowed with cilia, and are therefore dependent on the action of external forces for their locomotion. To these belong the great and highly differentiated order of so-called "red sea-weeds," or *Florideæ*, chiefly marine plants which in form and colour develop a number of wonderfully beautiful varieties, which no one who has ever attentively observed them on the sea coast will ever forget. Their antherozoids, which are generally spherical, are discharged into the water as motionless cells, and are yielded up to the play of currents, in the same way as, in the anemophilous phanerogams, the pollen-grains pass as a dust into the atmosphere from the anthers, and are moved to and fro by the wind. There are many analogies between *Florideæ* and higher phanerogams as regards their sexual conditions. Thus amongst the former we find many species which are diœcious, similar to the lowest phanerogams amongst gymnosperms, and to others of higher order. The chances of fertilisation in their case are, therefore, similar to those applying to diœcious phanerogams. Often the male plants grow at a considerable distance from the female plants of the same species. In the spring of 1878 Dr. Dodel-Port, during a series of microscopical examinations of Adriatic red sea-weeds extending over four weeks, found only female and agamic (tetrasporous) specimens of *Polysiphonia subulata*, and looked in vain for male specimens, of which only at the end of his investigations he could obtain a few. Their respective localities of growth were evidently considerably apart, and yet at all times Dr. Dodel-Port found female specimens in all stages of fertilisation. The antherozoids ejected by the male plants

must have found their way to the distant female plants in spite of their own immobility and general passive condition. The sea-water, therefore, must have been frequently in vivid motion.

These facts being ascertained, the idea readily suggested itself that possibly animals might take part in the fertilisation, particularly as there is no lack of small marine animals roaming about in the *Florideæ* forests, such as Infusoria, Crustacea, Annelids, Starfish, Bryozoa, Sponges, &c. But what particularly attracted Dr. Dodel-Port's attention was the regular occurrence of innumerable bell-shaped animalcules (*Vorticellæ*) on the shrub-like branches of *Polysiphonia subulata*. On closer investigation of the phenomena of fertilisation in the female organ, during and after adhesion of the antherozoid with the trichogynium, Dr. Dodel-Port eventually arrived at the conviction that in the case of *Polysiphonia* the little *Vorticellæ* facilitate the conveyance of the antherozoids to the trichogynium, and that they act according to a natural law, in the same way as do the pollen-collecting bees when, by visiting the willow-catkins, they assist in their fertilisation. The investigation of the sexual conditions of *Florideæ* is as yet in its infancy; it is to be hoped that more numerous researches in this direction will shortly be made, and possibly relations may be found to exist between other species of this order and certain animals similar to those discovered by Dr. Dodel-Port in the case of *Polysiphonia* and *Vorticella*. The details of the interesting relations in this case are briefly as follows:—

Fig. 1 represents the male reproductive organ (antheridium) of *Polysiphonia subulata*, magnified 480 times. These antheridia often appear in large numbers at the upper branch-ends of the male plant, laterally close to the apex which continues its growth, at the spot where in the vegetative state young branches would form. In their earliest stage the antheridia consist, like the young branches, of a single row of cells. By repeated longitudinal and lateral divisions a polycellular body is soon formed, which begins with a short stem-cell (*st*), and which on the side furthest away from the maternal thallus-branch is protected by a forked hair (*gh*). The ripe antheridium in external appearance reminds one very much of a maize-cone; a row of four to six cylindrical cells (*aa*) in the axis of the whole organ represents the spine of

the cone, while the surface is covered by numerous spermatozoid mother-cells (*sm*, *sm*) representing the grains of maize. Before the antheridium is ripe the latter are polyhedral; but afterwards they assume a round shape, as the drawing shows. All parts of the male organ are colourless; the antherozoid mother-cells are filled by a fine granular plasma, which is soon differentiated into a round body, and subsequently discharged from the mother-cell as an antherozoid (*ss*). Thus within a short time the ripe

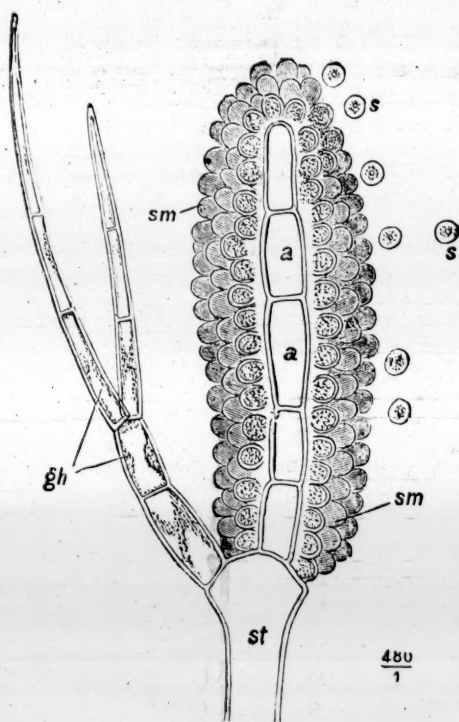


FIG. 1.

antheridium discharges some 400 to 800 spherical antherozoids into the surrounding sea-water. The single antherozoid is a little globule of protoplasm, without cell-wall or any locomotive organ. In the centre of this globular primordial cell a strong magnifying power shows a little nodule which strongly refracts light, and round which a few smaller colourless plasma-granules are grouped. As it freely floats in the water, the antherozoid is analogous to a pollen-grain of an anemophilous phanerogam.

The female reproductive organ of *Polysiphonia subulata* is a polycellular carpogonium of relatively high differentiation.

It originates upon the female plant closely below the apex of the thallus-branches, and generally there are several of them forming successively at varying intervals from the branch-end downwards.

Fig. 2 shows the carpogonium-bearing branch-end of a female specimen of *Polysiphonia subulata*; *cg'* is a very young carpogonium; *cg*, *cg* are two mature ones; *t'* and *t''* two trichogynia; *Vort.* are two *Vorticellæ*. The whole is magnified 300 times.

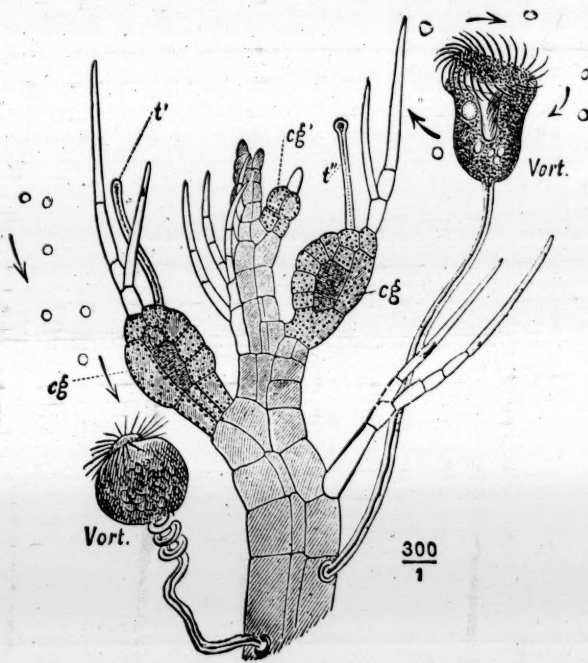


FIG. 2.

In Fig. 3 a carpogonium (*ca*) is represented, magnified still more (480 times); *Vort.* is a *Vorticella*; *ss* the antherozoids. In the mature state the carpogonium consists of three essential parts, viz. :—

1. The basal portion, *f* (Fig. 3).
2. The fertile spore-forming part, *cg*.
3. The hair apparatus, *t* and *gh*.

The basal portion (*f*) consists of five tubular cells running parallel to each other, of which in Fig. 3 only two are seen. Then follows the fertile part (*cg*), which is an oval cellular body, consisting of some 20 to 26 cells. A central cell, copiously filled with granular protoplasm, is surrounded by a number of irregular, peri-

pheric cells, and awaits fertilization, in order afterwards to transform itself into the spore-forming apparatus, while the remaining 19 to 25 peripheric cells become the case of the spore fruit through further divisions (see also Fig. 4, *h h*). The uppermost part of the female organ is the hair apparatus, which in *Polysiphonia* consists of the forked hair (*gh*), and the trichogynium (Fig. 3, *t*). The forked hair forms very early upon the young carpogonium, and indeed

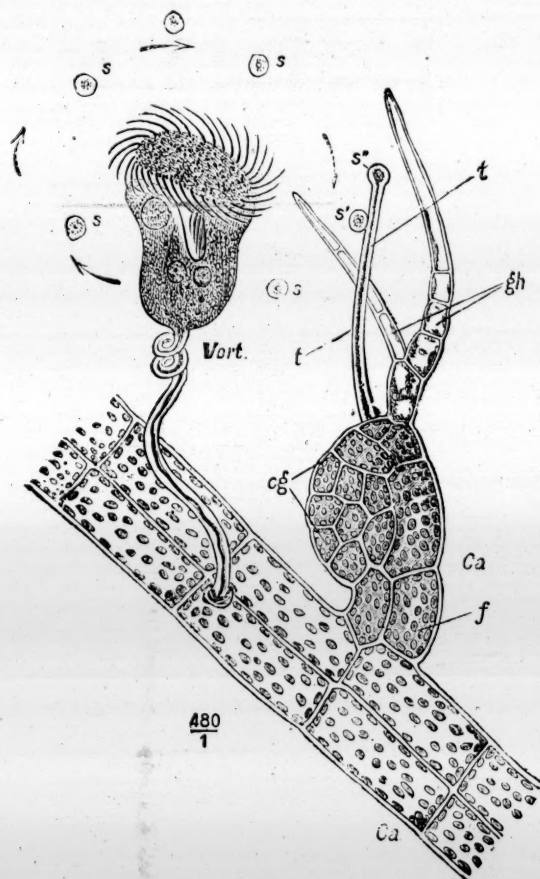


FIG. 3.

long before the trichogynium is formed; its position is always upon the true apex of the whole organ, although at times it stands apparently laterally from the apex. The duration of its existence, its presence at the time of fertilisation and its disappearance immediately afterwards, prove it to be an organ of some use in that process. The most essential and important part of the hair apparatus, however, is the trichogynium (*t* in Figs. 2 and 3)—*i. e.*, the receptive organ, which in *Florideæ* has a similar

signification to that of the elongated style in many phanerogams, while the central part (*c g*) of the carpogonium is the analogue of the closed ovarium of angiosperms. The trichogynium is a tender, colourless hair consisting of but a single cell, which rises from the carpogonium laterally from the apex of the latter, and does not quite attain the length of the forked hair (*g h*). It forms just about the time when all other parts of the carpogonium have attained that degree of differentiation which they possess during fertilisation. In the full-grown state, the trichogynium is of the same thickness in its entire length, and rounded off suddenly at the upper end. The narrow canal of the trichogynium contains colourless finely-grained protoplasm.

Now if antherozoids of *Polysiphonia subulata*, freshly discharged by the antheridia of male plants and accidentally carried near by currents, come into contact with the upper part of the trichogynium, they get firmly attached to the latter. It is particularly the apex of the trichogynium which possesses the faculty of retaining the globular antherozoid. Then the granular protoplasmic contents of the antherozoids pass into the interior of the trichogynium (Fig. 3, *s''*). A part of it descends down the trichogynic canal into the carpogonium, giving the fertilising impulse to the central cell of the carpogonium. This process is quite similar to the corresponding one in phanerogams.

As the antherozoids of *Florideæ* are wholly devoid of active locomotive organs, the possibility of fertilisation—*i.e.*, the coming into contact of the antherozoids and trichogynium—of course rests entirely upon a lucky chance. The antherozoids reach the female organs passively, either by their own weight, or through the currents of the water caused by waves, wind or tides, and doubtless in many cases through the incessant movements of some marine animals. The greater the distance between antheridia and carpogonia the smaller, of course, are the chances of fertilisation; the more violently the water is moved about in the vicinity of and between the separated organs, the more probably will the lucky accident of the union of both elements take place.

During a long series of investigations of the reproductive phenomena of *Polysiphonia*, Dr. Dodel-Port found regularly on the bushy thallus, and particularly upon the uppermost and younger branches, an enormous number of the well-known stalked

animalcules, *Vorticellæ*, which had settled there, and were as usual in incessant motion. Often they appeared in dozens in the field of the microscope, and with the constant vibration of their cilia were very troublesome, until Dr. Dodel-Port discovered their friendly co-operation in the fertilisation he was studying. He was a frequent witness of the process depicted in Fig. 3, where numerous antherozoids were whirled round and round in the whirl produced by a *Vorticella*, and where antherozoids frequently came in contact with the trichogynium, and remained attached to it (Fig. 3, *s'* and *s''*) for a longer or shorter period. It was

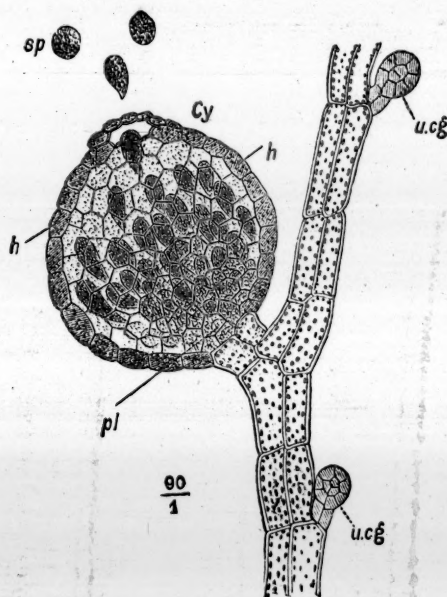


FIG. 4.

entirely due to the motion caused by *Vorticellæ* that Dr. Dodel-Port was enabled to follow the phenomenon of the attachment of the antherozoids to the trichogynium from beginning to end. The motions of the *Vorticellæ* are particularly varied through the repeated contractions of their stalks into short spirals, and thus they cause various currents in the water, by all of which the antherozoids are carried along, like any other small and passive body that may be suspended in the water. (Compare Fig. 2, where one of the *Vorticellæ* is just contracting its stalk, the arrows in each case indicating the direction of the currents.) The presence of numerous *Vorticellæ* thus imparts to the passive antherozoids a kind of motion much resembling that of the

sperm-cells of other cryptogams which are endowed with active cilia. *From this it follows with mathematical certainty that the probability of the antherozoids finding their way to the trichogynium in the presence of Vorticellæ is immensely greater than would be the case if there were no animals present.*

At the same time it is evident that this probability is further increased in the case of *Polysiphonia subulata* through the presence of the forked hair (*gh*) in the vicinity of the trichogynium, because the whirls caused by the animalcules will often be cleft by the forked hair, and thus secondary whirls will be produced. Often, in *Polysiphonia*, carpogonia were found which were not fertilised. Thus Fig. 4 represents a ripe and spore-ejecting cystocarp (*cy*) and two carpogonia (*ucg*) which remained unfertilised. This was particularly the case on thallus-branches which were less densely crowded with *Vorticellæ*—another, although negative, proof of Dr. Dodel-Port's theory. It is not particularly remarkable that *Vorticellæ* should inhabit *Polysiphonia* in large numbers, because these animalcules, as Dr. Dodel-Port observed, feed with predilection on the antherozoids of this plant. Thus we have here a condition of things similar to the relations between certain flowers and pollen-consuming insects. The consumption of antherozoids by *Vorticellæ* is, of course, far too insignificant to merit any consideration, particularly if compared with the great advantages regarding fertilisation which the presence of the animalcule brings with it. Moreover, a comparison of the male plant of *Polysiphonia* with a female specimen shows that here also, as in most phanerogams, thousands more male cells are formed than are necessary for fertilisation.

After fertilisation the carpogonium develops into a cystocarp, *i.e.*, the spore-forming fruit (Fig. 4). Shortly after fertilisation has taken place the whole hair-apparatus disappears. The wall-cells of the carpogonium now begin to grow quickly and divide by membranes perpendicular to the surface. They form a cellular case (Fig. 4, *h, h*), which has an orifice in the apex, long before the spores are ripe. In the meantime the central cell of the fertilised carpogonium begins to form a number of densely-packed short branches, which, as a series of cells radiating in all directions, fill the basis of the capsule-shaped fruit. The central cell is therefore called the placenta-cell. At the ends of the ramified cell-series which radiate from it, pear-

shaped and dark red spores (carpospores) form, which, as soon as they have attained a certain size become detached and pass into the water through the orifice at the apex of the cystocarp. In this state they are perfectly capable of further development, and soon begin to germinate.

Dr. Dodel-Port concludes his interesting paper with the following suggestive remarks:—"The total absence of active organs of locomotion in the antherozoids of *Florideæ* points to a common ancestor from which the different branches of the *Florideæ* have inherited the immobility of the antherozoids. No doubt that during the differentiation of the red sea-weeds many forms have died out in consequence of the fertilisation not taking place through the passivity of the male cells, while other forms have retired to localities which through active water-currents favour the process of fertilisation in spite of the immobility of the antherozoids. It is now well known that most of the existing *Florideæ* are found on the coasts of warmer seas which are constantly washed by the waves, while the northern coasts, which are covered by crusts of ice during a great portion of the year, are very poor in red sea-weeds. Future researches will show in many of these aquatic plants how far the differentiation of the genera took place in the sense of an adaptation to the small marine animals which inhabit them, and favour their fertilisation in the way pointed out. If many sea-weeds in their bushy shrub-like thallus harbour certain infusoria, bryozoa, hydræ, sponges, crustacea, annelids, and small star-fishes, and afford them excellent hiding-places or nourishment, so that these animals inhabit them with special predilection, then it is certainly possible that occasionally a correlation was formed, or adaptation took place, which was mutually advantageous, and which would find numerous analogies in the domain of the multiple cross relations between the higher flowering plants and insects. In this sense it is considered a duty to submit to the criticism of biologists a point hitherto overlooked in the biology of red sea-weeds, and bearing upon the explanation of the morphological differentiation of submerged aquatic plants."

THE NATURALIST IN NIDDERDALE.

BY JOSEPH LUCAS, F.G.S.

(Concluded from p. 370.)

Pateley Bridge lies at the centre of a circle of somewhat over forty miles radius that passes through several points on the eastern and western seaboard. Thus it is forty-one miles from the Tees-mouth, forty-three from Morecambe Bay, forty-seven from the Ribble near Preston, and forty-five from the Humber at Goole. This central position, taken with the great vertical range of the district, 100 to 2300 feet, is eminently favourable for the occurrence of birds, resident, marine, migratory, and casual. Sea-birds occasionally find their way across, and perhaps I should say not uncommonly, if all the occasions on which they have done so had been placed on record. In the summer Gulls slowly flap their way all along the eastern slopes of these hills. In June, 1868, I saw one above Billing Hill, in Airedale; on July 29th, 1869, one over Haverah Park; and on May 11th and 13th, 1871, a Lesser Black-backed Gull at Kettlewell, in Wharfedale. A young Gannet, in speckled plumage, was found on Bewerley Moor (1000 feet) in 1858, and is now in the possession of Mr. Yorke, of Bewerley Hall.

In the absence of any recent records of the Golden Eagle in the district, the names of "Arna Nab," "Arnciff," "Arnagill," indicate that it formerly bred on these hills. Buzzards are occasionally seen on the moors. At Christmas, 1868, Mr. Yorke's keepers trapped a Common Buzzard on Gouthwaite Moor (1200—1500 feet). Mr. Ormerod shot a Rough-legged Buzzard on the moors near Lofthouse about 1864. The Rough-legged Buzzard is said to be commoner here than the Common Buzzard. The Merlin breeds on the moors. On February 22nd, 1868, I saw one a few miles west of Bradford; on June 12th, 1869, one on the moor behind Guy's Cliff (1100 feet), a magnificent cliff with a northerly exposure, over 100 feet in height, in the lower part of Nidderdale. Its flight is swift, low, and graceful. As it flies its wings seem sharper than a Kestrel's, and its tail thinner, approaching the appearance of a Swift. The last week in June, 1869, Mr. Yorke's watchers found a Merlin's nest on Ramsgill Moor (1250—1500 feet, N.E. exposure), with four young birds.

On July 1st, 1869, I saw a Red-backed Shrike at Hole Bottom (950 feet), a dell full of trees and bushes, slightly exposed to the S.E., chattering and making a great noise. It is here a rare bird, as I have no other record of its occurrence. Says Chaucer, in 'The Friar's Tale':—

. "As full of jangles,*
As full of venom be these *Wariangles*." †—V. 6990.

These birds commence their autumnal migration in July, when they are to be seen along the coast of Sussex. On July 30th and 31st, 1867, I saw two at Heene, and on August 7th and 8th S. F. Lucas shot two migrating.

The Tits, at least the Great Tit and the Blue Tit, are clever mocking birds. On January 24th, 1868, I heard the Great Tit uttering a cry like that of the Wryneck, but not so loud and sweeter. I have noticed the same note in the Lesser Spotted Woodpecker, and a young Kestrel. In 1867 there was an extraordinary abundance of holly-berries at Heene, Sussex. The Blue Tit (August 9th) was constantly in the holly bushes, in company with a Blackbird, cutting off the berries, the ground being strewn with them. On Sunday, October 25th, 1868, at Pool, Wharfe-

* "Chattering."

† Mr. Speght explains "Wariangle" to be "A kind of birds full of noise, and very ravenous, preying upon others, which when they have taken, they use to hang upon a thorne or pricke, and teare them in peeces and devour them." A faithful description of the habits of the Red-backed Shrike. Cotgrave's 'French Dictionary,' published 1650, translates *arneat* by "The ravenous bird called a Shrike, nym-murder, wariangle." The word is derived from the Old French *guare*, war, and *jangler*, to chatter. Now *guare* is one of the warlike terms of German origin which the Roman inhabitants of Gaul, or the "Old French," picked up from their enemies in the battle fields by the Rhine (Max Müller, Lect., 2nd ser., p. 263). It was first heard probably as a war cry, as Cotgrave gives it, "*guare*, *guare*, war, war." The Anglo-Saxon "*Serie*" is rendered by Manning, in his 'Gothic and Anglo-Saxon Dictionary,' by "*Turdus*," i.e., *Turdus viscivorus*, the Screecher. The Old Norsk *Skrikja* is rendered by Cleasby, in his 'Icelandic Dictionary,' "The Shrieker," and *Sól-skrikja* (i.e., sun- or day-shrieker), "Shrike, Butcher-bird." ('Itinerarium, or Travels of Eggersh Olaffson,' 1772, p. 582), while the modern Swedish *Skrikja* is the Jay, another "screecher." "Shrikes Wood," near Bewerley, takes its name from either the present species, or the Jay. It is also noteworthy that *jangler* in Old French first meant "to chatter like a bird," but afterwards came to mean in English *jangle*, "to quarrel," while *jangler* dropped out of the French language. It is consistent with this and the above that the chatterer which was first said to "jangle" was a quarrelsome chatterer, the Red-backed Shrike. But what a volume of cruelty is compressed into the name *nymmurder*, which expresses that which pursues, seizes, and tears to pieces, and so murders! (Old Norsk *ninna*, to pursue; *myrdir*, murderer).

dale, I watched from inside my window a Blue Tit busily engaged in pecking at the apparently bare bark of a trained cherry tree, on the young shoots and buds, and when he had gone I looked to see what kind of food he had been eating. The extremities of the young branches and buds were covered with the Aphis, much changed in colour, very few being the light green they are in summer; they were dirty brown and black. The Blue Tit, through the autumn, goes in flocks with the Cole Tit and Great Tit, together numbering perhaps fifty birds. They like the sheltered deep valley of the Washburn, where all three kinds abound. The Blue Tit has a powerful, sprightly note like "Chickwéed, chickwéed, chickwéed," quickly repeated. The Long-tailed Tits go in little flocks of six or seven; they have a sweet little single note, a straightish flight, stronger than one would expect, with their long tails stuck out behind. It is uncertain whether one of the Tits is meant in the lines:—

*"Parus enim quamvis per noctem tinnipet omnem
At sua vox nulli jure placere potest."**

The Pied Flycatcher breeds in Bolton Woods, near Barden Tower, Wharfedale; at Bewerley and at Harefield Wood, Pateley Bridge, Nidderdale; and at Hackfall, near Masham, on the Ure. All these are deep wooded valleys. They rear two broods in the course of the summer; the first brood is brought off in May. On July 15th, 1869, the second brood flew from the nest at Bewerley. At Harefield Wood the site chosen was in an old wall, which can be entered in three ways, two of which are easy to the bird, and the third so narrow as to cause it to squeeze very flat to go in or out; nevertheless this is the one generally chosen. The cock appeared to build the nest, and used to prevent the hen from approaching till it was ready. Harefield Wood is on the west side of the hill, is admirably protected from the north and east, and is itself cover from the west. Accordingly it is one of the very few places in the district of which it can be said that it abounds with Whitethroats, Lesser Whitethroats, Spotted Flycatchers, Red-

* From a very beautiful little Latin poem of the third century, called "Elegia de Philomela," written by Albus Ovidius Juventinus (about A. D. 210). It expresses the cries of forty-one different birds by appropriate verbs, and is the sole authority for the meaning of several of the Latin names. It is to be found in the 'Anthologia veterum Latinorum epigrammatum et poematum.' Henricus Meyerus, Lipsiæ, 1835. Several pretty verses are cited in the present notice.

starts, Robins, Chaffinches, and at least two pairs of Pied Flycatchers. The Pied Flycatcher has a melancholy little "tweet," very like the Spotted Flycatcher. They dart from the wall, &c., just as the Spotted Flycatcher does. They are a trifle more sprightly, not quite so downcast-looking as the latter, and evidently have the mastery of it. They are naturally very tame. The Spotted Flycatcher is far from common. In 1868 I did not see one till May 8th, when I saw one in Jonas Wood, near Farnley Hall, Wharfedale. This bird feeds its young after they have left the nest. It utters a weak, piercing note.

The Kingfisher is very rare, I should say almost exterminated. On March 4th, 1868, I saw one on the River Aire near Bingley; and on November 9th, 1870, one at Burrill Wood (350 feet), in a narrow "clough" with well-wooded sides, sheltered, and one at Mickley (175 feet), on the River Ure, where it flows through broad meadows.

The Raven, which has given its name to a great many places, is now confined to the wildest and most elevated parts of the West Riding. I have only seen it twice. On July 23rd, 1868, I picked up a young Raven at Carlton, on the south side of Otley Chevin; and one hot day (May 6, 1871), after a wearisome climb to the summit of Pen-y-ghent, J. R. Dakyns and myself watched a pair wheeling about, croaking hoarsely, at a great height above us, doubtless taking us for carrion as we lay motionless upon our backs enjoying their beautiful evolutions. *

I have never known the Hooded Crow to breed on these hills, nor even to stay the summer. In 1868 I saw the first on October 20th, at Yeadon Ghyll, and on the moors near Lanshaw House (800 feet); in 1869, on October 13th, at Appletreewick, Wharfedale; in 1870, on October 28th, in some fields near Newton

* Max Müller remarks, "The Emperor Julian, when he heard the Germans singing their popular songs on the borders of the Rhine, could compare them to nothing but *the cries of birds of prey*." The original (in the 'Misopogon,' written about A. D. 352) has *τοῖς κρωγμοῖς τῶν τραχὺ βοᾶντων ὀρνίθων*, and the Latin translation in the Leipzig edition of 1696 has "*clangorum quos aspere clamantes aves edunt*," while Eugene Talbot, in his French translation, 1863, gives "*cris rauques de certains oiseaux*," but boldly adds in a foot-note, "*Les corbeaux*." See Voltaire, 'Essai sur les Mœurs,' Preface. *Clangorum* is not a good rendering of *κρωγμοῖς*, for the "Elegia de Philomela," which was written 140 years or so before Julian wrote the 'Misopogon,' says, "*Clangunt porro Aquilæ . . . et crocitat Corvus*." *Crocito* is for *crocio*, Greek *κρώζω*, *κρώξω*, to croak as a Raven or Crow, from which *κρωγμός*, a croaking noise.

House, in the flat country of the Vale of Mowbray (110 feet). These birds are very plentiful in Norway, where they breed in the summer, as I have observed in 1870 and 1871. The Hooded Crow is a noticeable bird, and has attracted my attention when quite two miles off. It has far greater power of wing than a Rook. Rooks begin to build in February. They rob old nests to build the new, and apparently wage war upon each other's colonies, as they both bring twigs to and carry twigs away from the same rookery. Rooks begin to take long flights at least as early as September, when they fly to the salt marshes by the sea. They are seen during the summer high up on the moors, often when there are no other birds visible. The Jackdaw is a bird of the low country, but the Magpie goes up the dales and gills, only stopping short of the moors.

*"Pica loquax varias concinnat guiture voces,
Scurrili strepitu quidquid et audit ait."*

The Jay also keeps to comparatively low country; it occurs in some of the large "falls," or "hangers," in Airedale, as in Calverley Wood, at 225 feet, and in large woods throughout the district.

The Nuthatch is rare; I have seen it only once, in the deep wooded gorge of Hackfall (500 feet). The Wryneck and the Tree Creeper, common in the South of England, I have never seen anywhere in the district. In December, 1868 or 1869, Mr. Ormerod shot a Lesser Spotted Woodpecker in Bak'stone Gill, near Loft-house; but it is a rare bird here.

The Cuckoo ranges from sea-level up to the high moors, where they ascend as high as Ring Ouzels or Titlarks are found to make nests for them. In spring, up to 1200 feet or higher, there are few places on the moors in which it is possible to be out of hearing of a Cuckoo. Cuckoos begin to go in little flocks of six or seven by the end of July or beginning of August. On August 2nd, 1867, I saw in Surrey a flock of six Cuckoos in the plumage of the first year, and later in the day a second group of four, also in the plumage of the first year. They arrive in April in flights of twenty or thirty birds. The Cuckoo has a long, plaintive, somewhat wailing note, very soft and musical. It has also a rattling note, not altogether unlike that of a Landrail. Cuckoos vary much in colour, some young birds being dark ash-coloured, or cinereous;

others dark rufous, resembling the colour of a Kestrel; while some are intermediate and tinged with both colours.

The Evejar occurs in the district. On May 8th I started one in Jonas Wood, near Farnley Hall, Wharfedale, and I have also seen and heard them in the woods under Guy's Cliff, Nidderdale. They begin to migrate early in August, when they appear on the coast of Sussex. This, I presume, from its jarring noise, is the "Gable-ratchet," its note resembling the noise made by a small ratchet-wheel. It has also a piercing, distressed note, which sounds from several different places. Like the Grasshopper Warbler, this bird seems gifted with ventriloquial powers.

The Swift frequents some of the higher ground. They do not associate with Martins, and are never seen in the same air together. When Swifts fly high, Martins may be seen nearer the ground; but when Swifts are low there are no Martins. Martins ascend to the Dale Head. Sand Martins I have seen only twice in the district: at Apperley Bridge, Airedale (about 200 feet), where they build in the sandy river bank; and on the Ure below Tanfield. In a gravel-pit here (150 feet) there was one lenticular bed of sand, one foot long by six inches thick in the middle, and in this I found a Sand Martin's nest with eggs on June 12, 1870. This bird does not seem to ascend above two or three hundred feet. The highest elevation at which I found a Pied Wagtail's nest was 1050 feet, near the Dale Head. This was on the face of a limestone scar, in a tuft of moss covered with long slender grass, six feet above the waters of the Nidd; young birds, May 21, 1871. The hole was bored into the clump of moss from low down in the side; nest made of grass. Pied Wagtails arrive in parties of forty or fifty early in April. On March 11th, 1868, I saw a pair of Grey-headed Wagtails beside the canal near Manningham. Striking points are the head being a much lighter grey than the back, and the small size of the bird.

The Titlark breeds on the moors, especially on the grassy moors. I give the descriptions of three nests, taken down from nature in 1871:—

No. 1. Near Carlton, Coverdale, N.W., 1000 feet, May 19.—Open grassy moorside bank above little running stream. Bent-grass nest, round; five eggs. Internal diameter, $2\frac{1}{2}$ inches. Length of eggs, .75 in.; breadth, .6 in.; ochreous ground, thickly

covered with dark brown stains, blotchings, and markings—darker at larger end; still darker lines and streaks at larger end.

No. 2. Near Lodge, Nidderdale, S.W., 1600 feet, May 22nd.—Open grassy moor, nest with three young birds in a tuft of ling and bents. Young birds covered with long grey down.

No. 3. Angram Pasture, Nidderdale, S., 1350 feet, May 23rd.—Found a Titlark's nest with eggs. Instead of being all dark, they were dark only at upper end, with usual darker markings and stripes. The lower halves were very pale greyish ochre, almost white. The bird was distinctly striped down the breast.

On February 22nd, 1868, I saw an immense flock of Chaffinches, which must have numbered some thousands. They were in beautiful bright feather, apparently all cocks. A strong west wind was blowing, with hail and rain, and they took shelter in the low hedges. The place was a steep hillside, two miles east of Shipley, Airedale, facing north-west, in the teeth of the wind.

The Redpoll breeds in Nidderdale. On May 19th, 1869, I found a nest in an alder bush on the bank of the Nidd (about 390 feet), just above the weir at Pateley Bridge. The nest was in a fork a few feet from the ground, composed externally of roots and twigs. Four eggs; small, pale bluish green, spotted and streaked at larger end with brown.

I noticed the Bullfinch on four occasions only, as follows:—November 9, 1870. Hedges near Rasp Wood, three miles S.W. of Bedale, sheltered situation (375 feet); Nov. 29, 1870. Ellington Firth, in valley in large wood, sheltered (500 feet); Dec. 6, 1870. Roadside hedges between Azerley and Kirkby Malzeard (375 ft.); June 13, 1871. Follifoot Ridge, western exposure, summit of ridge (400 feet).

The only Crossbills I have ever seen wild stayed for some time in the autumn of 1874 at Sandsend, near Whitby.

Starlings go right up to the Dale Head, but I do not remember seeing them on the moors. They begin to flock in June, as I observed near Beverley, June 17th, and again early in August, 1869. In February the Starling sits upon a twig and sings three notes; one as if his beak were chattering with cold, another like in sound to the Corn Crake's, but far less loud, and a third like the clucking of violin-strings with the finger. It utters also a fourth note—a long sweet cadence gradually dying away and descending the scale at the same time.

The Dipper I did not observe in the Aire below Shipley, doubtless on account of the polluted state of the river; nor in the Wharfe below Otley; nor have I noted it in Nidderdale below Pateley Bridge; nor in Washburndale below Blubberhouse. In the Ure, however, I have seen it as low as Ripon (90 feet). It follows almost every beck right up on to the moors. They are generally seen singly, sometimes in pairs. On May 9th, 1869, I watched two Dippers in the afternoon flying about over some shallows near Ramsgill. They kept chasing each other at a great pace, flying close above the water. In order to escape its pursuer, the pursued now and then followed through the water, entering and leaving it without any apparent check. I was astonished at the freedom with which they could transfer themselves from the air to the water or the water to the air. Even a duck seems to rise out of the water with difficulty. They rested frequently on snags, stones, and roots of trees, and kept up an incessant "chip, chip," quickly repeated. The Dipper's nest is sometimes so placed that the bird would have to fly through the water every time it entered or left the nest. They frequently build under waterfalls.

I observed the first and last flocks of Fieldfares as follows:—Stainburn Moor (800 feet), October 15, 1868; Crag Wood, near Brimham Rocks (500 feet), June 1, 1869; Appletreewick, Wharfedale, Oct. 17, 1869; Hardgap, near Stean, Nidderdale (1200 ft.), on border of moor, Sept. 2, 1870.

The Thrush and Blackbird go up to the Dale Head, at least as high as 1200 feet, where their voices tend to the wild beauty of the scene.

"Et Merulus modulans sat pulchris *tinnitat* odis,
Nocte ruente tamen cantica nulla canit."

"Lodge, May 21, 1871. The chorus of birds on this still, calm, sunny evening, 6.30 P.M., consists of the notes of the Curlew (of which a pair, wheeling about, has gone to the Nidd to drink), the Ring Ouzel, the Cuckoo, the Snipe high in air, and the Chaffinch, with his sharp 'wit, twit, twit,' while Starlings are busy with their young in the neighbouring barn-roofs.

'Tunc Turdus *truculat*, Sturnus tunc *pusitat* ore.'

7 P.M. The Thrush has only just begun to sing, and now, save for the distant Curlew, he has it all to himself. 7.30 P.M. Curlews

all around making a sweet melodious chorus; Swallows gone; Martins flying about; Starlings gone; the last warm, soft, rose-coloured tint fading and darkening on the opposite cliffs. Four distinct Thrushes singing; Partridge noisy in the dale below the house.

'Caccabat hinc Perdix, hinc graccitat improbus Anser.'

A troop of clouds that came over this afternoon have all gone, but there is a haze forming."

The Ring Ouzel has a sweet song, not unlike parts of a Thrush's. It has a beautiful note, which it repeats thrice,—not inaptly represented by the words "tree, tree, tree,"—smart, but extremely melodious. The Ring Ouzel does not ascend to the very highest hills, nor does it go below the heathery moors, and even on these is not to be seen everywhere. Its favourite haunts are broad shallow valleys with numerous running "sikes," and having on each side a flat ridge. There the ling grows long, and its nest may be found near to some running stream. I give descriptions of four of these from nature:—

No. 1. May 13, 1869. Brimham Rocks (900 feet), in an east and west sike, on the northern side, under a tuft of heather.—Composed of sticks of heather and pieces of dry strong grass, rather loosely compacted, but strongly built, and lined with finer grass. The nest contained four eggs; light bluish green ground, mottled with dirty brown spots.

No. 2. May 14, 1869. Pateley Moor (1000 feet).—Constructed like No. 1, and exposed to the east. Three eggs.

No. 3. May 11, 1871. Moors near Kettlewell (1440 feet), in a cleft in limestone.—Made of grass, &c., lined with fine grass; internal diameter, 4 inches; outside, 7 inches. Four eggs; pale blue ground, faint blotches, pale purple and brown, thicker at upper end; length, 1·2 in.; breadth, ·9 in.

No. 4. May 22, 1871. Lodge (1075 feet), under a tuft of wood-sage in a vertical bank on a bed of sandstone.—Made of wiry roots and stems of bracken, pieces of moss and coarse grass, lined with fine grass; internal diameter, 4 inches, round. Four eggs; pale green ground, irregularly but somewhat thickly speckled with umber blotches of a pale tint, and less distinctly with pale purple, especially about the larger end; a few dark lines and dots at larger

end; length, 1.25 in.; breadth, .9 in. Nest nearly three inches deep; seven feet above stream.

The Ring Ouzel is somewhat uncertain in its appearance upon the South Downs; sometimes it will not appear for years together. On January 29th, during the present year (1879), I observed a small flock amongst some furze bushes on the downs about a mile above Michelgrove, in Sussex.

Let me record my tribute of admiration for the gentle bird, the Hedgesparrow, whose rich little canzonet may be heard on the silvery mornings of those rare bright days when an atmosphere, clear as crystal and of alpine purity and freshness, descends to invigorate the less favoured regions of the plain in bleak November.

The Redstart is quite as characteristic of the larger woods as the Grouse, Golden Plover and Ring Ouzel of the moors. It abounds in the district, and ascends to 1000 feet, perhaps higher. I have noticed it in Airedale, Wharfedale (as high as Starbott), Nidderdale, Colsterdale, and Coverdale. The Willow Wren, Redstart, and Chaffinch have a note in common—most delicately modulated and drawn out by the Willow Wren, rather more quickly repeated by the Redstart, and somewhat more coarsely by the Chaffinch, which seems to mock the Willow Wren.

There are no Stonechats in Nidderdale. On July 6th, 1869, I saw the only Stonechat I remember to have seen anywhere in the neighbourhood; that was on Constable Ridge, near Haverah Park (750 feet). The place abounds with low stunted furze-bushes.

The Whinchat is extremely common, and ascends to 900 feet; in Airedale, east of Shipley, there is not a field without several. It has a favourite note, "tooe, tuck, tuck,"—the "tooe" drawn out beautifully modulated, the "tuck, tuck" rather reedy in sound, somewhat like picking the end of a thin piece of wood with the finger. The Whinchat and Wheatear have this note in common; so great is the similarity that I question whether the most practised ear could tell by the sound alone which bird uttered the often-repeated and slightly varied "twee, chuck, chuck." They have also the same habit of flying before one along the road—a trick common to the Whitethroats, Flycatchers, and many others. Whinchats swarm along the railway between Pateley Bridge and

Daere Banks, and Wheatears are common on the higher ground. They abound in the flat green fields of Cracoe (700 feet), near Linton in Wharfedale, where there are stone walls or iron railings, and no hedges, with a few scattered thorns. They evidently consider, with Col. Lovelace, that—

“Stone walls do not a prison make,
Nor iron bars a cage.”

The young Wheatears arrive at the south coast early in August, where they flock during the autumn.

I have not seen the Grasshopper Warbler in the whole district, except once, about June 15th, 1869, at Garth Crook (1000 feet), on the border of the high moors of Barden Fell, between the Wharfe at Bolton and the Washburn, an exposed situation, with an easterly aspect. I have observed it farther south, near Huddersfield.

Notwithstanding the efforts of a local author to disprove the existence of the Nightingale in this district, I venture to record two localities in which I have seen these birds—Esholt Woods, in Airedale, in the summer of 1868, and on May 8th, in Jonas Wood, near Farnley Hall, Wharfedale. Nightingales usually reach the south coast the first week in August. On July 27th, 1867, I saw the first at Heene. On the 15th one was for some time on a geranium, in front of a window where I was writing, pecking the underside of the leaves. On looking to see what it could get, I found numbers of cobwebs stretched in various directions to catch the flies that might shelter there from the rain that had fallen lightly all the morning. On August 16th I saw a beautiful cock bird in the asparagus bed, of which dense forest it seems particularly fond. It runs nimbly up the perpendicular stalks, now and anon pecking on its way. It flew to a tree about thirty yards off—a straight slightly undulating flight.

I used frequently to hear the Blackcap singing through the night, in company with the Corn Crake, at Apperley Bridge and at other places in the district.

The Whitethroat occurs in Nidderdale, where its “ee tschuk” may be heard, but not plentifully.

The Lesser Whitethroat is by far the commonest bird in the whole district, from the vale of York up to the borders of the moors, where its place in this respect is taken up by the Titlark. It ascends Nidderdale to Angram (1200 ft.), at the Dale Head. The inclined plateaux, peculiar to the eastern slopes of the millstone-grit range,

with their small clusters of *Acer pseudo-platanus*, and frequent small ponds, afford just the conditions that suit this bird. No table land is too exposed or too elevated; provided there is a cluster of two or three trees and a pond, there will be Lesser Whitethroats. This lively bird has a loud attractive song, consisting of four notes quickly repeated, then another four a shade lower, then a third and a fourth four, thus:—'''' After the last four the song dies away in a beautiful little trill. It has also a note like the Whinchat's, softened and modified. The Lesser Whitethroat's note has ceased by the beginning of July, when the pretty and frequently repeated trill is much missed. This bird may frequently be seen inspecting the intruder from the leafy cover of its favourite tree, *Acer pseudo-platanus*.

The Wood Wren is somewhat more local, but in suitable situations is sure to be heard. Tall trees and thick underwood, firs and *Acer pseudo-platanus*, deep sheltered "gills" with wooded sides, and large woods, are the favourite haunts of this bird; where these prevail it ascends to 1000 feet, and to the borders of the moors.

The Willow Wren ascends the dale to Angram (1200 feet); but I have no special notes about it, from which I conclude that the bird is rare here.

The Chiffchaff ranges up to little above 700 feet. The steep wooded sides of valleys and extensive woods, with tall firs and beeches, or any tall trees, are the favourite haunts of this bird. It is not so common as the Lesser Whitethroat, but considerably more common than the Wood Wren.

The Common Wren ascends to 1000 feet, perhaps higher.

The Rock Dove breeds at Guy's Cliff, and at Brimham Rocks. On May 13th, 1869, one flew out of a hole bored for more than a yard into the peat on the top of a crag amongst the Hare Head rocks. A yard from the nest I picked up two eggs, one broken, the other addled; these may have been turned out by a Cuckoo, but I had no opportunity of proving this point. The Rock Dove only lays two eggs.

On August 12th, 1871, Mr. Ormerod shot a Grey Hen on Cockley Hill (1300 feet), on the moors east of Lofthouse.

The Grouse is a capricious bird in its choice of residence. The fact that they do not abound everywhere on the moors is

doubtless not without its influence on the leases of moors. They are most plentiful in the zone between 1000 and 1500 feet, and do not go much above 1700. Spots where bilberries ripen, kept moist by springs, and with a southerly exposure, attract them in autumn, though they lie under a northern "edge" in the spring. For their nests they like broad shallow hollows with springs at the edges, and a flat ridge, at least on one side, on to which they adjourn to crow and sun themselves. "Cocklakes" is the name of one of these "Riggs" on the moors, west of the River Washburn. What a flood of beauty is shed upon the word when we learn that it means the "playing-ground"* of the moor-cock! They build also in the peat in deep-stream courses. Here is a description of two nests:—

No. 1. May 10, 1871. A light nest, beside a deep-stream course in sandstone. Made of round rushes, a few feathers mixed; $7\frac{1}{2}$ inches across. Seven eggs; pale grey, irregularly speckled and blotched.

No. 2. Same date. Deep-stream course, in peat under tuft of grass; exposure N., sheltered. Made of grass; 7 inches across. Ten eggs.

Many young Grouse are hatched before this; and it is astonishing how fast they grow, how soon they are able to fly, and how strong they are on the wing.

It has been my good fortune to spend nine successive years—spring, summer, autumn and winter—on and around the moors, and to have sat among the long heather, in the fresh spring evenings, listening to the melodious clamour of the piping birds. Here I will fall back upon first impressions, lest the picture should suffer from the rude touch of familiarity:—"May 22, 1869. On Masham Moor, a glorious expanse of heather, lying to the north of Nidderdale, 1500 feet above the level of the sea, from 6 to 8 P.M. Air resplendently clear and transparent, not a cloud to be seen; the sun lighting up the moor. Grouse calling all around, with Curlews wheeling in the air, and Golden Plovers swiftly skimming the ground; the Ring Ouzel suddenly rising on to some spray of heather, and uttering his melodious 'tree, tree, tree'; the Snipe wildly flying high in air, with his peculiar knocking noise and startled whistle—hundreds on every side, all together in full chorus. The charm of the place, with its wildness,

* Old Norsk *leika*, to play; *leikr*, a game or play.

the incessant harmonious clamour of the piping birds, and the complete novelty of the scene, inspired me deeply. The Golden Plover has a single sweet mellow pipe, which is answered by his mate a semitone lower; also a note, which he frequently repeats, $\cdot\cdot\cdot\cdot\cdot\cdot\cdot\cdot$, like the 'Hallelujah' of the 'Hallelujah Chorus,'—and who knows but that this refrain may not have been thus suggested to the great composer!—while with some of his single pipes there is a beautiful and inimitable little roll. The Curlew keeps up an incessant 'toor-r-lui, toor-r-lui,' in a flute-like, melodious, piping tone, while the Grouse utters a peculiar guttural call as he flies off, in the time of what is generally understood as a 'double knock,' the syllable repeated being 'coc.' All these together form a chorus to be heard nowhere else but in these moorlands."

The Woodcock sometimes appears on the moors. On the 31st of October, 1871, I saw one near Greenhow Hill (1325 feet).

The Peewit (called "Tewfit") is generally distributed and very plentiful, ranging to at least an equal height. Young birds begin to call imperfectly in July. They come down to the Wharfe to drink just as it is getting dark, and continue crying "peewit" as late as a quarter past nine.

The Corn Crake is found in the larger dales, but does not ascend to their upper parts.

The Heron pays periodical and solitary visits to the dales. One was hanging about the Washburn from September 14th till October 31st, 1868, and doubtless much later. One came to the waterfall in Wath Wood, Nidderdale, on August 2nd, 1869; but with the exception of one or two occasions in the upper part of Wharfedale, I have not noted them elsewhere.

I have been much struck with the tactical methods of the Snipe. On July 30th, 1868, I put up four of these birds in a stream among the broad meadows between Otley and Burley, in Wharfedale. They divided, each in its own course flying headlong at a great pace for about two hundred yards up stream. On being a second time roused they rose, each in its own course, to a great height, and flew right away.

The Common Sandpiper is found along the streams in the dales throughout the spring. I have no note of its occurrence above 900 feet.

The following summary will give an idea of the distribution of some of the birds observed in the district, and will show the various elevations at which they have been respectively met with:—

SUMMARY OF THE ORNITHOLOGY OF THE DISTRICT.

Elevation.

HIGH MOORS.

2000 ft. Raven.

1500 „ Titlark, Buzzards, Snipe, Grouse, Golden Plover, Merlin, Ring Ouzel, Curlew.

Cuckoo, Fieldfare, Peewit.

DALES.

UPPER.

LOWER.

1200 ft. Dipper.

900 „ Sandpiper.

700 „ Heron, Whinchat - - - - - Redstart, Chiffchaff.

800 „ - - - - - Red-backed Shrike.

600 „ Redpoll - - - - - Nightjar, Nuthatch.

500 „ Pied Flycatcher - - - - - Jackdaw, Jay.

LOWLAND.

400 ft. - - - - - Corn Crake.

300 „ Sandpiper - - - - - Kingfisher.

200 „ - - - - - Sand Martin.

100 „ Dipper.

EASTERLY SLOPING PLATEAUX.

BARE.

WOODED.

1200 ft. Peewit, Swift.

1100 „ Gulls.

1000 „ Fieldfare - - - - - Lesser Whitethroat.

700 „ Stonechat, Wheatear.

600 „ - - - - - Wood Wren.

500 „ - - - - - Bullfinch.

ORNITHOLOGICAL NOTES FROM DEVON AND CORNWALL,

BY JOHN GATCOMBE.

On April 10th, wind E.N.E., several Swallows and Sand Martins made their appearance in the neighbourhood of Plymouth; and on the 13th, after snow, the wind blowing extremely cold, I observed the first Wheatear on the coast, the Common Sandpiper, and a solitary Black-headed Gull in full breeding plumage, which had not yet left us for its nesting quarters. During the remainder of the month several Manx Shearwaters were captured and brought in by our fishermen.

On May 5th there were several pairs of Turnstones and a single Knot on the Plymouth Breakwater. The Knot, although apparently an adult bird, was still in perfect winter plumage. By the 6th Whimbrels were numerous on the mud-flats. Swifts made their appearance in pairs on the 7th; and on the same day a fine young Brown Owl, almost fully fledged and nearly as large as its parents, was brought to one of our birdstuffers. Mr. Rogers, dealer in live birds at Plymouth, had three fine young Peregrine Falcons sent to him from the coast of Cornwall, and I am sorry to say that I heard of old birds having been trapped or shot during the spring, one of which came under my own inspection. A friend, writing from North Devon, a short time since, stated that a Peregrine had just carried off a good-sized young fowl which the farmer's wife was feeding in front of a farmhouse; it had also killed two and knocked down more of his own pigeons, and after having committed other depredations took its departure.

On May 9th a Great Northern Diver, in nearly perfect summer plumage, and weighing eleven pounds and a half, was kindly sent to me by Mr. Stephen Clogg, of Looe, on the Cornish coast, off which port it was hauled up—meshed and drowned, I believe—in a trammel-net three miles from the shore and from a depth of twenty fathoms, which shows the wonderful diving powers of the species. Had it lived a few weeks longer it would have completely assumed its full summer dress, which from examination I have ascertained beyond doubt is attained by a regular moult, and not by a change of colour in the feathers only, as some have supposed. The above-mentioned bird was a female, but the eggs in the ovary were not much developed, the largest not being

bigger than grains of No. 6 shot. It was very fat, and the stomach crammed with fish-bones, mixed with many small stones. I believe the breeding plumage of the females of our three species of Diver to be equal in brilliancy to that of the males, although perhaps the white spots may not be quite so large, and the same might be said of the Shag and Cormorant. On the 21st I received a further communication from Mr. Clogg, stating that two days before he had observed a pair of Black-throated Divers close by the shore, one of which appeared to be in perfect summer dress, adding that for many years before he had not seen a specimen of that species in any state of plumage.

A Ringed Guillemot was obtained during the month in the Sound, and an Iceland Gull made its appearance in our harbour, after a heavy gale from the north on May 14th, the latest date I ever remember to have noticed this bird on our part of the coast.

On June 7th some Puffins were brought in by the fishermen, and a friend told me that he had seen some lying dead on the shore at New Quay, on the north coast of Cornwall. On the 11th I visited the breeding-place of the Herring Gulls at Wembury, near Plymouth; but, although I observed several nests containing either eggs or young birds, not half the number of old ones were to be seen in comparison with former years. I have also remarked a great falling off in the numbers of both the Greater and Lesser Black-backed Gulls which annually visit our coasts in the spring. Can this be owing to the late unusually severe winter? I am sorry to say that robbing Gulls' nests is carried on to a great extent, where practicable, in Devon and Cornwall. Only a few weeks since a fine young man lost his life in trying to get at some young Gulls near the Land's End.

Swallows are very scanty with us this season, but of Swifts and Martins I think we have had about the average number. I may here mention an interesting anecdote concerning the Swallow related to me by some yachting friends, Mr. and Mrs. Cummins, residing at Stonehouse. On June 6th, when crossing the channel on their way to Jersey in the yacht 'Electra,' four or five Swallows flew on board, two of which, after having rested on deck for some time, came into the cabin, one of them actually alighting on the edge of a book Mrs. Cummins was reading, and there quietly sat looking up into her face with the utmost

confidence, Mrs. Cummins sitting perfectly still, talking to it, and, as she expressed it, only wishing the pretty little creature could talk too, tell her from whence it came, and understand that it should receive no harm. After awhile, thinking that the little voyagers must be hungry, but not knowing the kind of food they required, she at first tried them with crumbs, but finding these were not eaten, she caused some meat—ham, I believe—to be cut into small thin strips, so as to resemble worms as much as possible, and put into a basin of water, thinking by that means to tempt them to eat, but of course without avail. They remained on board for several hours, ultimately making their appearance on deck, and, finding the vessel to be in sight of land, took their departure, first hovering two or three times round the yacht by way of farewell, and then making straight for the coast, their kind friend wishing them “God speed.”

On August 9th Curlews returned to our mud-flats from their breeding-places, and flocks were constantly heard passing over the town by night. The last Swift observed by me was on the 7th; and by the 25th I saw numbers of Turnstones, Dunlins, and Ring Plovers on the Laira mud-banks; also many Yellow Wagtails, both old and young birds, in the adjacent meadows.

Captain H. Hadfield, in the last number of ‘The Zoologist,’ mentions the early appearance of Wild Geese passing over the Isle of Wight on June 30th. On July 14th a flock of these birds, seventeen in number, flew over Cannington, in Somersetshire, in a north-westerly direction.

OCCASIONAL NOTES.

PINE MARTEN IN LINCOLNSHIRE.—It may interest some of your readers to learn that a female Marten has been trapped in a wood near here, and, being now a very rare animal in this part of the country, has been preserved. I understand this is only the second instance of the occurrence of this species in Lincolnshire within the last twenty years.—CHARLES WINN (Appleby Hall, Brigg).

[Our correspondent having been so good as to forward the specimen for our inspection, we are able to state that it is the Pine Marten, and not the Beech Marten, as he at first supposed. In ‘The Zoologist’ for 1877 (p. 251) the Rev. A. P. Morres has recorded the death of a Marten-cat in

Lincolnshire (in a wood called South Wood, once noted for Martens, belonging to Mr. Thomas Drake, of Stainfield Hall), but the species was not ascertained, or at least not stated. Perhaps this is the second specimen alluded to by Mr. Winn. But a Pine Marten was trapped in the parish of Riley, North Lincolnshire, in 1865, as recorded by Mr. Cordeaux (Zool. 1866, p. 242), who refers to it as the second captured in that locality.—ED.]

WHITE-BEAKED DOLPHIN AT YARMOUTH.—On the 25th August last I saw on the beach at Yarmouth a very beautiful White-beaked Dolphin, *Delphinus albirostris*, which had been captured by some fishermen in their nets the previous night. In form and coloration it very closely resembled Mr. Clark's specimen taken at Lowestoft in March, 1876, and described and figured in the 'Proceedings of the Zoological Society' for that year (p. 686). Although of the same sex (female) and length, it differed in form very considerably from the Grimsby specimen figured with Mr. Clark's, being much more slender. I regret I made no vertical measurements for comparison with Mr. Clark's, but the following measurements of lengths very nearly correspond with those of the Grimsby specimen:—

Feet. Inches.

Total length from anterior edge of upper lip to notch in middle of caudal fin (in straight line) - - - - -	4	3
From upper lip to anterior edge of dorsal fin (along curve) - - - - -	2	1
From anterior edge of dorsal fin to notch in caudal fin (along curve) - - - - -	2	5
Base of caudal fin - - - - -	0	8½
Vertical height of caudal fin - - - - -	0	6½
Pectoral fin from junction with the body to tip along anterior edge - - - - -	0	11½
From anterior edge of upper lip to angle of the mouth - - - - -	0	6¾
From upper lip to anterior edge of blow-hole (along curve) - - - - -	0	9½
From upper lip to anterior corner of eye - - - - -	0	8½
From point to point of the flukes of the caudal fin - - - - -	1	0

Dental formula, $\frac{2}{1}\frac{6}{4}\frac{2}{1}$. Several of the front teeth had not pierced the gum.

Sex, female. Said to have weighed 110 lbs.

Three were said to have been seen together, one larger and the other slightly smaller than the one captured. The close agreement in colour and form of the Yarmouth specimen with that described and figured by Mr. Clark, although of opposite sexes, is very interesting; but a good figure of the adult animal is still a desideratum, that by Van Beneden (which I have not seen) not being considered satisfactory by Dr. Cunningham, and that by Miss Brightwell—making every allowance for difference of age—being obviously incorrect. Knowing Miss Brightwell's reputation as an artist, and the accuracy with which her figures of microscopic animals for

her father were made, I was very reluctant to form this conclusion. The skull of Mr. Brightwell's specimen is not in the British Museum, as stated in the Museum 'Catalogue of Seals and Whales,' but in the Norwich Museum. The error arose, as the late Dr. Gray explained to me, from his being under the impression that it was sent to him for the National Collection, whereas he was subsequently requested to return it to Norwich. I hope to place the skull of the present example also in the Norwich collection.—THOMAS SOUTHWELL (Norwich).

FULMAR PETREL BREEDING IN THE ISLE OF FOULA.—The announcement by Mr. Garriock (p. 380) that this species has adopted a breeding station in Shetland is so very interesting, that it may not be out of place to draw further attention to the subject, more especially as a similar occurrence took place in the Færoe Islands about 1839. In the year 1849 the late Mr. John Wolley visited the latter group, and in a paper read at the meeting of the British Association held in Edinburgh, 1850, and subsequently published by Sir William Jardine, 'Contributions to Ornithology,' 1850 (pp. 106—117), thus referred to the appearance of the Fulmar Petrel as a breeding species in the Færoe Islands:—"I have to record a very interesting fact with respect to the Fulmar, *Procellaria glacialis*, which has recently adopted some of the cliffs of the Færoe Islands as a summer station. In the time of Landt, who wrote in 1799, it was only known to those who fished far from the shore, but somewhere about the year 1839 it was observed by the rock-climbers breeding, for the first time, near Quelboe in Suderoe, and it has since much increased, and is scattered over several spots on the west cliffs of the islands of Skuoe and Great Dimon; in the latter place, the cliff in which it builds is of great height and quite perpendicular, and the ledges are very small and bare. Eight or ten of the nests that I examined consisted of a few small fragments of rock lining in a slight depression. The featherless abdomen of the bird is hollowed into a perfect egg-cup shape during the incubation, so that the single large egg has the warmth applied to it in the most effectual manner. I will not attempt to speculate on the reason of this remarkable change of locality in a bird supposed to be so constant in its attachment to certain breeding places. It is not found in Shetland or Orkney. St. Kilda is perhaps its only British, and also its most southern, station. It is, however, said to breed on the island of Barra, perhaps not South Barra, but Bara and Rona, two rocks far to the north of Cape Wrath and the Lewes, whose position was ascertained with accuracy in one of Parry's Arctic Voyages." Sir Edward Parry's observation, referred to by Mr. John Wolley, was taken on the 31st May, 1824, on his outward voyage to the Arctic Regions, in H.M. ships 'Heckla' and 'Fury,' and the west end of Bara is placed by that distinguished navigator in

latitude $59^{\circ} 06' 45''$, longitude $6^{\circ} 11'$. For a most interesting account of the various out-lying rocks of the west coast of Scotland and their feathered inhabitants, I must refer the reader to Captain Elwes' admirable paper on the "Bird-stations of the Outer Hebrides" ('Ibis,' 1869, pp. 20—37). This naturalist did not find the Fulmar breeding on Berneray (Barra Head) or other of the south isles of Barra in 1868, and in 1870 Mr. Harvie Brown and I met with similar experiences. Mr. Robert Gray ('Birds of the West of Scotland,' p. 499) records the interesting fact that the Fulmar bred in the south isles of Barra as late as 1844, since which date it has not been observed in those localities during the breeding season. Under ordinary circumstances I should not venture to question a statement published under the sanction of such an eminent authority as my friend Mr. Robert Gray, and indeed it is not my intention to do so now, but merely to point out that John Wolley, writing in 1850, seemed to accept with some hesitation the fact of the Fulmar breeding in South Barra. For my own part I do not consider it more extraordinary that this species should vacate old established breeding haunts than that it should adopt new ones; but it shows that the Fulmar is not so attached to certain breeding stations as used to be supposed. It would be interesting to find out about what date the Fulmar made its appearance as a breeding species in Skye, or whether it has always been recognised as such by the inhabitants of that island. *Procellaria glacialis*, as recorded by me in 'The Zoologist' for 1872, has greatly extended its breeding stations in the Færoe Islands since 1839, and since Wolley's visit in 1849, for in 1872 I found it breeding on Suderoe, Great Dimon, Skuoe, Mygenaes, Videroe, and Fugloe, or, in other words, throughout the group.—H. W. FEILDEN (Aldershot).

LATE STAY OF SWIFTS.—The late stay of Swifts during the present autumn has been the subject of general remark by naturalists throughout the country. Up to the present time (Sept. 25th) I have received reports of Swifts being seen at the following places on the following dates :—

- Aug. 20. Between Redcar and Teesmouth, "in thousands."
- „ 21. Loch Tay; Redcar and Teesmouth; only two or three remained.
- „ 22. Whitby.
- „ 23. Near Hartlepool.
- „ 25. Budleigh Salterton.
- „ 26. Withernsea, Yorkshire; and Lymington, Hants.
- „ 27. Darlington, flying S.W.; between Redcar and Teesmouth,
"another immense flight."
- „ 28. Between Redcar and Teesmouth, "about a dozen"; others at
Yarmouth.
- „ 29. Darlington, flying W.; Spurn Point; Landerfel, near Bala; and
Ryde, Isle of Wight.

Aug. 30. Between Redcar and Teesmouth, "a few"; Flamborough Head, "scores."

„ 31. Between Redcar and Teesmouth; and at Ipswich.

Sept. 1. Teesmouth, ten or twelve, "none seen here afterwards"; and Bedford, "several."

„ 2. Scarborough; Masham; Uttoxeter; and Hornsea Mere, "hundreds."

„ 3. Bridlington Quay; and Ipswich, flying S.

„ 6. Grantown-on-Spey; Riccal Common, near Barnsley; and about the Abbey Church, Selby, Yorkshire.

„ 7. Loch Tay; and Worcester.

„ 8. Remony, Loch Tay; Glenisla, near Alyth; and Gt. Chesterford.

„ 10. Penarth, "two"; and Castle Lough, Killaloe, Tipperary.

„ 12. On the Waveney, near Lowestoft; Great Cotes, Ulceby; and Ryde, Isle of Wight, "a solitary bird."

„ 15. A single bird, over the River Wharfe, near Wetherby, Yorkshire.

In the marshes of North Lincolnshire, during the past summer, Mr. Cordeaux has remarked how much higher than usual the Swifts have flown when hawking for food; showing that, notwithstanding the cold, wet, and ungenial weather, and the constant occurrence of heavy rains, the small insects they seek must have taken to a higher level, and been especially abundant in the upper regions of air. The why and the wherefore of this he leaves to meteorologists. It is doubtless in some manner connected with a peculiar state of the atmosphere, and the amount of moisture with which it is charged.—J. E. HARTING.

ATTEMPTED INTRODUCTION OF THE NUTHATCH INTO IRELAND.—In reply to your letter of enquiry about my attempt to introduce the Nuthatch into Ireland, I am sorry to say that I have not been very successful in my experiments. In the summer of 1877 Mr. Borrer, of Cowfold, Sussex, gave me seven young birds. I reared and sent to Ireland five of these, but unfortunately, the second or third day after their arrival, four died quite suddenly. They seemed perfectly well in the evening, but early the following morning my keeper found them dead in the bottom of their cage. Last year (1878) Mr. Borrer gave me eleven more young birds. Of these the keeper to whom I entrusted them at the Zoological Gardens, only succeeded in rearing two, which lived well and quietly together in the same cage until last January, when, without any previous warning, one set upon and killed the other. I was thus left with one bird from each year, and these I turned out last spring, but I do not know whether or not they are a pair. On the receipt of your letter I wrote to ask my keeper whether he had seen them since, and I have only just received his answer to say that he had never seen the birds after they were turned out. I am not much

surprised at this, as the woods here are large, and my keeper has been very busy rearing pheasants; but if they have remained about the place they ought to show themselves during the autumn and early winter. A great deal of my wood is a natural growth of holly, hazel, and oak, which I think ought to suit the Nuthatch. There are also a good many ants, but they do not form regular ant-hills, and I have tried and failed to introduce the large wood ant. I have now, through the persevering kindness of Mr. Borrer, four fine young birds, which I hope to take with me to Ireland next week; but I am a little doubtful what to do—whether to turn them out this autumn or to keep them until the spring. My experience with the Nuthatches—and not with them only, for I have tried Hawfinches, Crossbills, Blackgame, and Capercaillies—shows the great difficulty of trying to introduce any birds into strange localities. I believe, however, that the chief obstacle to success is the difficulty of getting a sufficient number to allow for casualties. Nothing but the interest Mr. Borrer has shown in the experiment has enabled me to give the Nuthatches a fair chance; for I find it next to impossible to purchase any of our less common birds. I have tried for a long time to buy a few Spotted Woodpeckers, but without success, although I have given commissions to several of our London bird-fanciers. I shall be happy at any time to give you information as to how I am getting on with my various experiments, which are not confined to birds, for I am now trying to establish some foreign moths.—EDWARD H. COOPER, Lieut.-Col. (Markree Castle, Collooney, Co. Sligo).

NESTING OF BLACKGAME IN WOLMER FOREST.—To show the difficulties attending the increase of Blackgame at Wolmer, I find, on reference to my notes, that a nest of nine eggs was ruthlessly taken by boys in charge of cattle grazing on the Government ground on the 1st June, 1878, and no direct evidence of the robbery established; while out of a nest of seven eggs examined by Capt. Feilden and myself on the 13th of the same month only two eggs proved fertile, five addled ones being left in the nest! Whether this latter lamentable failure was due to the cold wet weather prevalent at the time, or to the well-known preponderance of male birds, I am unable to say. It serves, in any case, to account for the fact that there is no marked increase in the number of Blackgame in the Forest, in spite of all restrictions and strict preservation of the Grey-hens.—S. G. REID (Capt. R.E.).

DISCOVERY OF THE EGGS OF THE CURLEW SANDPIPER.—In 'The Ibis' for July Dr. T. M. Brewer, of Boston, thus announces the discovery by an American naturalist of the egg of the Curlew Sandpiper, *Tringa subarquata*, hitherto unrepresented by authentic specimens in any collection:—"Mr. Ludwig Kumlien, Naturalist to the Expedition sent to the Cumberland Region, was so fortunate as to find the Curlew Sandpiper breeding in

North Greenland, near Christianshaft, in the summer of 1878. He mentions the species as not uncommon. Several eggs were procured, through the attentions of Governor Fencken. Two examples of the eggs were brought home by Mr. Kumlien; and these are now in the collection of the Smithsonian Institution. During a recent visit to Washington I availed myself of the opportunity to examine these specimens; and from the notes then taken I send you the following description:—One of these eggs measures 1.52 inch in length by 1.05 inch in its greatest breadth. Its ground colour is thickly marked with blotches of two shades of umber-brown; one of these shades is quite light, the other much darker. These are most numerous on and around the larger end, and are in a somewhat longitudinal direction, with a tendency also to a spiral course. There are also a few spots of a very dark (almost black) colour on the larger end. The other egg measures 1.47 inch by 1.04 inch, and is of a much more pyriform shape. Its ground colour is very light greenish drab, with rather sparse markings of a deep umber. The markings are larger and more confluent about the greater end of the egg, where they are chiefly disposed in a circular ring. The rest of the egg is sparsely marked with the same. About the larger end are a few very dark markings. The two eggs, as you will notice, differ somewhat in their shape, and present also something of a contrast in their ground colours." So far as one can judge by the description given, these eggs appear to be very similar in colour and markings to those of the Dunlin.—J. E. HARTING.

GREEN SHAG IN NORTHAMPTONSHIRE.—A young bird of the above species was caught whilst asleep upon a pinnacle of the towers of Arthingworth Church, near Market Harborough, on August 31st, and brought to me alive and uninjured. This is not the first occurrence of this species in this county which has come to my knowledge, but strikes me as worthy of record, as I believe the Green Shag to be an uncommon bird upon our eastern coasts.—LILFORD (Lilford Hall, Oundle).

MANX SHEARWATER IN NORTHAMPTONSHIRE.—A Manx Shearwater, *Puffinus anglorum*, was shot on the River Nen, near Titchmarsh, on the evening of September 4th, by my friend and neighbour, Mr. G. E. Hunt, who sent it to me. As in the case of the Green Shag above recorded, I know of a previous occurrence of this species in our county; but the weather that can drive such a hardy sea-rover as a Shearwater some forty miles inland at this time of the year is certainly very exceptional.—LILFORD (Lilford Hall, Oundle).

HOBBY AND COMMON SCOTER IN BEDFORDSHIRE.—Mr. Covington, taxidermist, of this town, has shown me a male Hobby which was shot near Bedford at the latter end of July. I hope, in recording this capture for the benefit of future faunists, I shall not lay myself open to the charge of

"pandering to the vanity of its destroyer" (*cf.* Zool. 1878, p. 76), for I much regret its destruction. Mr. Wright, of Clifton, near Biggleswade, informs me that he has in hand "a male specimen of the Black Scoter, *Ædemia nigra*, which was shot on the 19th August, by Mr. Hare, of Compton Mills, near Shefford." I fancy this is a most unusual date at which to meet with a Scoter in this part of England.—C. MATTHEW PRIOR (Bedford).

TAWNY OWL NESTING IN A BURROW.—In regard to its nesting habits, the Tawny Owl seems to differ a good deal from other Owls. As a rule, the eggs are deposited in the hole of some tree, but it has been observed to make an open nest in a hollow of a fork, seven feet from the ground, and sometimes to make use of the deserted nest of a Rook (see Gray's 'Birds of the West of Scotland,' p. 61). It has also been known to lay its eggs upon the ground on a heap of fir-needles ('Ibis,' 1866, p. 324). In 'The Ibis' for July last (p. 378) two instances are recorded of its nesting in a burrow. Capt. J. W. P. Orde mentions a nest of five eggs so placed which came under his observation in Argyllshire. One had rolled away into a branch of the burrow, the others were nearly hatched in the second week of April. Mr. Bruce, of Ederline, at the foot of Loch Awe, on April 18th, 1876, found a nest of this bird in a rabbit-hole, about two feet deep in a sloping bank. The nest contained four young Owls differing greatly in size; two were at least ten days older than the other two, and no two of them looked quite of the same age; they were covered with whitish down, and kept their eyes shut. The nest also contained a rat and two mice, freshly killed, and with their heads taken off. This approximation in habit to the well-known burrowing Owls of America is curious and worth noting.—J. E. HARTING.

COMMON SCOTER IN NORTHAMPTONSHIRE.—A female of this species, *Oidemia nigra*, was killed near Woodford Mill, on the River Nen above Thrapston, and sent to me, in the flesh, on August 20th. I consider this occurrence worthy of record, not only because it is the first appearance of the species in this neighbourhood which has come to my knowledge, but also on account of the unusual time of year for the visit of such a sea-loving bird to an inland locality.—LILFORD (Lilford Hall, Oundle).

GREY WAGTAIL GREGARIOUS AT ROOSTING TIME.—At p. 391 of 'The Zoologist' for 1878, Mr. H. Chichester Hart observes that he noticed on one occasion a number of Grey Wagtails congregated together at roosting time in some reed-beds in Ireland. As this seems to be a newly recorded fact in Ornithology, I have much pleasure in stating that quite recently (September 4th) I have frequently observed small parties of Grey Wagtails, consisting of a score or so of individuals, resorting to the reed-beds by the Ouse as soon as it begins to get dusk. At this time of year this species is very abundant here.—C. MATTHEW PRIOR (Bedford).

DESTRUCTION OF WOOD PIGEONS IN SCOTLAND.—Speaking at the Central Banffshire Farmers' Club on the 15th August, Viscount Reidhaven said:—"I daresay some of you will remember some years ago, when I had the pleasure of addressing you in Mr. Longmore's hall, that I ventured to suggest the getting up of an association for the destruction of Wood Pigeons. However, that fell to the ground; but I wish to read to you a few returns showing that my father did not forget about the Wood Pigeons. I will read you the returns of what has been done at Cullen House between 1876 and 1879. In 1876, 1256 eggs were destroyed. In 1877, 1172 old Pigeons, 1033 young Pigeons, and 6593 eggs were destroyed, making a total of 8798. In 1878, 1320 old birds, 446 young birds, and 5946 eggs were destroyed, making a total of 7712. In 1879, 804 old birds, 124 young birds, and 1399 eggs were destroyed, making a total of 2327. Besides these, there were killed by my father and shooting friends 436 old pigeons during two seasons. My father gives so much money to anybody who brings young or old birds or eggs, and the amount of money which he had expended in this way from 1876 to 1879 has been £117 13s. 3d. The total number of birds and eggs that have been destroyed altogether during these years has been no less than 20,529."

CURIOUS DEATH OF A MOORHEN.—From the last 'Annual Report and Proceedings of the Belfast Naturalists' Field Club,' obligingly forwarded by the Secretary, we learn that at one of the meetings Mr. Thomas Darragh brought under the notice of the members a Moorhen which had been brought to him for preservation. This bird was found dead on the banks of a small pond in the neighbourhood of Richmond, on the Antrim Road. When found it was still warm, and it did not appear to have been killed by violence. Curious to know the cause of death, Mr. Darragh made a careful examination, and found, on dissection, that death had resulted from the presence of several small annelids, apparently leeches, one of which he found firmly adhering to its lungs, another to its liver, and two almost embedded in its kidneys. The only way he could account for their presence in the viscera was by supposing they had entered by the windpipe, pierced the lung, and found their way to the other parts of the body. It was stated that the pond near which the bird was found is supplied by the overflow water of the town basin, and that it was a matter worthy of serious consideration whether or not these dangerous annelids were derived from that source; and if so, whether there is any possibility of their reaching the water-cisterns, and causing fatal results to the ratepayer who may unconsciously imbibe a few. The specimens, which are upwards of three inches in length, were exhibited, and Mr. Darragh, on the suggestion of the President, promised to hand them to a competent authority for examination.

ADDER TAKING POSSESSION OF A NEST.—Looking over last year's notes, I recently came across the following, which I intended at the time to send for publication in 'The Zoologist,' but which, in the hurry and scramble of a change of quarters from Aldershot to Ireland, found its way to the lowest depths of a portmanteau instead of the pages of that welcome periodical:—"June 4, 1878. Warder Ford reports a strange incident. He was at Fleet Pond, and seeing an Adder lying coiled up in the thick herbage at the foot of a bush at the water's edge, he struck at it with a thick stick and killed it. To his astonishment, the blow also knocked a young Reed Bunting, *Emberiza schæniclus*, out of a nest on which the Adder had been lying, fortunately doing it no injury. It turned out that the reptile had coiled itself up—probably already gorged by a previous heavy meal—on the top of the Bunting's nest, containing four young birds, like a veritable dog in the manger, waiting till its appetite returned before devoting its gastronomic energies to the consumption of its victims." It is satisfactory to know that the whole of the brood safely left their nest in due time.—S. G. REID (Capt. R.E.).

BOAR-FISH ON THE DEVONSHIRE COAST.—The shore on the western side of Plymouth, on August 12th, was strewn with Boar-fish, *Capros aper*. I asked some fishermen, who were drawing a seine for Mackerel, whether they had caught them; but they said that they were caught by the trawlers in the channel, who in coming into Plymouth threw them overboard when turning out their nets, and as there was a strong easterly wind blowing at the time it accounted for so many being driven on the western shore. I should say there were more than a thousand of them, and almost all of the most beautiful colour, some quite crimson, others more scarlet or pink; but all more or less beautifully banded or striped. I found, however, that these bands soon faded or disappeared altogether on being exposed to the light and air. They had a peculiarly strong fishy smell, and their very small scales were exceedingly dry and rough to the touch. The construction of the protruding and retractile snout is very curious. On asking the fishermen, out of curiosity, what they called them, they one and all answered "Cuckoo-fish"; but I think what is generally by fishermen called by that name is the Cook Wrasse, and sometimes one of the Red Gurnards.—JOHN GATCOMBE (Durnford Street, Stonehouse).

THE OCCURRENCE OF LEPTODORA IN ENGLAND.—At the recent meeting of the British Association at Sheffield, Sir John Lubbock, in the Department of Zoology and Botany, called the attention of the Section to the occurrence in England of *Leptodora*, a very interesting crustacean

first found in deep lakes abroad, and more recently in a reservoir near Birmingham. Like many marine organisations it was as transparent as glass. This rendered the creature less conspicuous to its foes. Like other animals of the same group it laid two kinds of eggs. The young at first were quite unlike their parents, so unlike that they were thought to be a distinct species. Sir John then gave a description of this little animal, and, by means of sketches, illustrated the peculiar functions of the different organs, pointing out the difference of the organs in male and female.

INSECTS WHICH INJURE BOOKS.—At the recent meeting of the British Association, at Sheffield, Prof. Westwood, in the Department of Zoology and Botany, read a paper "On the Insects which injure Books." Referring to an address delivered by Dr. Hagen, on July 2nd, 1878, before the American Library Association, on the same subject, Prof. Westwood passed in review the life-history of the different species of insects which have been found to destroy books and printed papers, several of which were not noticed by Dr. Hagen. The caterpillars of the moth *Aglossa pinguinalis*, and also of a species of *Depressaria*, often injure books by spinning their webs between the volumes and gnawing small portions of the paper with which to form their cocoons. A small mite, *Cheyletus eruditus*, is also found occasionally in books kept in damp places. A very minute beetle, *Hypothenemus eruditus*, forms its tiny burrows within the binding of books. *Lepisma saccharina* also feeds on paper, of which a very curious example was exhibited of a framed and glazed print of which the plain paper was eaten, whilst the parts covered by the printing ink were untouched. White ants (*Termitidæ*) are a constant source of annoyance in warm climates; and Prof. Westwood also noticed the ravages committed by the cockroaches, *Blatta orientalis*. The insects that do the greatest injury are *Anobium pertinax* and *A. striatum*, commonly known as the "death watches," burrowing through the books, even, it is recorded, drilling through twenty-seven folio volumes. Various remedies for the destruction of these insects were mentioned and especial notice was directed to a 'Report of the Commission appointed to inquire into the Decay of Wood-Carvings, and the Means of Preventing and Remedying the Effect of such Decay,' issued by the Science and Art Department in 1864. Prof. Westwood then detailed the various remedies proposed, as washing with solution of corrosive sublimes in alcohol, exposing the books to the vapour of benzine, or carboic acid, or hydrocyanic acid, or fumigating with burning sulphur. Placing the volumes under the exhausted receiver of an air-pump for an hour has also been found successful by Dr. Hagen.

PROCEEDINGS OF SCIENTIFIC SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.

August 6, 1879.—J. W. DUNNING, Esq., M.A., F.L.S., Vice-President, in the chair.

Donations to the Library were announced, and thanks voted to the respective donors.

Mr. Phillips exhibited living specimens of both sexes of *Spercheus emarginatus*, taken at West Ham.

Mr. Stainton exhibited, on behalf of Mr. Grigg, of Bristol, larvæ of *Röslerstammia Erælebella*, a genus of which the larvæ had hitherto been unknown. These were obtained from lime trees near Bristol, feeding externally on the leaves, quite exposed. They were very transparent, showing the whole of the interior of the larvæ, and with the segments deeply incised. When full-fed they turned down the edge of the leaf and spun the cocoon within the fold thus made, just like the larvæ of the genus *Orniæ*.

Miss Ormerod read a paper entitled "Sugar-cane Borers of British Guiana," and exhibited specimens of the insects referred to in different stages of development. The first—a moth stated to be a *Proceras* (sp.?)—was the most destructive, and the other insects were Coleopterous belonging to the genus *Calandra*—*C. sacchari* and *C. palmarum*. Miss Ormerod made the exhibition on behalf of the Colonial Company, who were anxious to receive any information as to available and practical methods of dealing with these attacks.

Mr. W. L. Distant stated that these insects had long been recorded as destructive to the sugar-cane in the West Indies, and that the circumstances were almost the same on the plantations in the Straits Settlements at Malacca, where the usual remedy, and possibly the only one, was searching for and burning the infested canes, thus gradually diminishing, and possibly eventually to a great extent extirpating, these destructive insects.

Mr. Swinton contributed the following note:—

"At page xii. of the 'Proceedings of the Entomological Society of London' for 1877, contained in the third issue for that year, I find the following observations recorded:—'Mr. Meldola stated that . . . the larva of *Liparis auriflua*, which feeds upon hawthorn, sloe, apple, oak, &c., and which possesses the well-known property of "urticating," could be adduced as an example of a larva feeding on non-poisonous plants, and yet elaborating poisons by chemico-physiological processes.' Mr. McLachlan remarked that the received opinion, on the other hand, was that 'the urticating property was due to mechanical irritation, the numerous brittle hairs of the larva

entering the skin.' Mr. Dunning and Mr. Waterhouse raised the question whether the hairs thus penetrating the skin might not possess some poisonous quality.

"On the penultimate and ante-penultimate segments of the Gold-tail Moth, *Liparis auriflua*, will be seen dorsally two scarlet conical and truncated tubercles, which superiorly present a keyhole-shaped orifice. These when the caterpillar contracts its tubercles, which it does in the fashion of a sea anemone, enlarge by the constriction to a triangular shape, and a colourless liquid wells up to their rim. A pencil-point dipped in this and applied to the cheek or eyelid will at once renew the said burning sensation, and leave little doubt as regards the caustic property of the fluid. The larva then in this instance poisons its lances, and if a magnifying power be applied, the drops of moisture conglobing on the hairy armature are revealed to view, squirted from the hinder craters, by constriction we may presume, since touch immediately produces a contraction in the hinder segments of the caterpillar."

The following communication was received from Mr. R. M'Lachlan:—

"In the 'Comptes Rendus,' of the Belgian Entomological Society of the 5th July (1879), is a notice by M. Mélise on the subject of correlation of mutilation in the larva with deformity in the imago. M. Mélise operated upon ten selected silkworms by cutting off the right metathoracic leg of each. All went through their transformations, and the operation caused, apparently, little inconvenience, for they recommenced feeding almost immediately afterwards. The effect on the moths produced from these larvæ was as follows:—One was deprived of three tarsal joints, but the claw was developed. Three were deprived of three tarsal joints, and of the claw also. Three had only the femur and tibia. One had the leg 'amputated' in the middle of the femur. The two others had only a stump, scarcely a millimètre in length. M. Mélise adds that in not one of the moths was the leg absolutely absent, and that the variation in the amount of deformity probably resulted from the difficulty of performing the amputation in the larvæ at precisely the same place in each. In the case of insects with incomplete metamorphoses parallel experiments have often been made, and with similar results; but with Lepidoptera they have been so few as to render confirmatory evidence of the statements of other experimenters of much value."

Part II. of the 'Transactions' for 1879 was on the table.—R. MELDOLA,
Hon. Secretary.
